ANIME GENERATION USING GENERATIVE ADVERSARIAL NETWORKS (GANs)

BY

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Basic Project Details:

Project Title:
Anime Generation using Generative Adversarial Networks (GANs).

Project Summary:
With advancements in artificial intelligence and machine learning techniques, we are now at a stage and advancing more into it, making it reach a point when we are trying to solve more complex problems, it has conventionally happened over time that the collected data is not as diverse as it should be and with time it becomes difficult to find image data. This has created a problem, a problems that enables models not to be trained well enough for existing scenarios.

In our opinion as a group, and with reference from various inclusive research explorations, we find that data is not well collected to represent all sort of communities, people of unique origins, various sexual orientations, people of colour, differently abled people, people that do not follow the conventional old testaments of data and public definition.

Therefore, it becomes important to collect more data and also, when this lacks, we need to produce data identical to real world data, so that we can train models without humans worrying about their privacy of getting exposed and yet being really inclusive to enable all communities.

Keywords :
styleGAN, Inclusion, Anime, Truncation, Stochastic Approach.

Objective :

1. Using existing data to segment images.
2. Make a network mask of images.
3. Mapping the network.
4. Noise reduction.
5. Implement a GAN model and run it to create more data.
6. Verify accuracy to real world expectations.

Expected output and outcome of the proposal:
We as programmers and scientist are close to a point where we can create more human faces, that don't yet exists, this explores creative side and imagination side of a machine. The problem arises when these models are not very accurate, the results look differentiable to actual humans and hence it becomes important to practise and improvise this.

To do this, we need more data but privacy issues could hinder this, so we try to generate new cartoons and anime characters, this will help us learn with time and understand and implement techniques that at some point of time will generate images that are not very differentiable from actual images.

Our objective is to play with this and try to generate anime that look as if it were actually sketched by a professional artist.

Other technical details of the proposal:

1. Origin of the Proposal: *Fuelled by scientific necessity of data and images to help train models and diversify them to be more inclusive.*

Researchers simultaneously train two models: a generative model G that captures the data distribution, and a discriminative model D that estimates the probability that a sample came from the training data rather than G. The training procedure for G is to maximize the probability of D making a mistake. This framework corresponds to a minimax two-player game. In the space of arbitrary functions G and D, a unique solution exists, with G recovering the training data distribution and D equal to 1/2 everywhere. In the case where G and D are defined by multilayer perceptrons, the entire system can be trained with backpropagation. There is no need for any Markov chains or unrolled approximate inference networks during either training or generation of samples. Experiments demonstrate the potential of the framework through qualitative and quantitative evaluation of the generated samples.

2. Review of status of Research and Development in the subject

2.1 International Status: *At international level, GANs are being looked at very progressively as a solution to data shortage for training models and validating them at initial stages, GANs would give creative freedom and have a great extent for freedom.*

They are looked as a great field of research and are comparatively a very new arena of skillset for developers and people. Google AI, OpenAI, Neuralink and Various Entertainment and Art Based companies are looking at GANs as a very wide and in-depth field of research.

Researchers have presented a neural network-based batch equalization method that can transfer images from one batch to another while preserving the biological phenotype. The equalization method is trained as a generative adversarial network

(GAN), using the StarGAN architecture that has shown considerable ability in style transfer. After incorporating new objectives that disentangle batch effect from biological features, we show that the equalized images have less batch information and preserve the biological information. We also demonstrate that the same model training parameters can generalize to two dramatically different types of cells, indicating this approach could be broadly applicable.

Ian Goodfellow conceived generative adversarial networks while spitballing programming techniques with friends at a bar. Goodfellow, who views himself as "someone who works on the core technology, not the applications," started at Stanford as a premed before switching to computer science and studying machine learning with Andrew Ng. "I realized that would be a faster path to impact more things than working on specific medical applications one at a time," he recalls. From there, he earned a PhD in machine learning at Université de Montréal, interned at the seminal robotics lab Willow Garage, and held positions at OpenAI and Google Research. Last year, he joined Apple as director of machine learning in the Special Projects Group, which develops technologies that aren't part of products on the market. His work at Apple is top-secret.

The craze of GANs have reached a level, when recently there are specializations launches by the famous deeplearning.ai for this field.

2.2 National Status: *While India is at the hub of a technical boost, it looks as if GANs are not being researched a lot on. GAN are still being incorporated widely only in project works and image analysis and creation. We are still looking forward to have a state-of-the-art level of research in this particular field.*

Generative Adversarial Networks (GANs) are a class of Neural Networks, which can be used for modeling the underlying data distribution from a given set of unlabeled samples. GAN comprises of two competing networks, a generator, and a discriminator. The generator learns to map a random vector to the high dimensional data such as image, while the discriminator network learns to discriminate between the real and the synthesized samples. Finally, this competition leads to the generation of realistic samples, which are undiscriminating to human observers. These models are of prime importance in modern AI research with enormous potential towards realizing Generalized AI.

2.3 Importance of the proposed project in the context of current status

If we as a group try to use a single word, it would be "exploration". Working on this is not a scientific cadre from our side but is a deep dive into the world of GANs, we are trying to create and yet, explore possibilities of the future of what could be done. While our focus this time is successful understanding of the project and execution, our wider goal is to grasp it to a level so that we could come up with aid to GAN and neural code blocks and algorithms as an idea for advancements on the theoretical side of computation. This would be an approach to achieve clearance and get to a point of high performance in data achievement.

2.4 If the project is location specific, basis for selection of location be highlighted:

Our project, conceptually, is not at all location specific, but when we look deeper, it would cover all locations in this world, this would help us understand GANs, which would ultimately help make training data inclusive, for people with different

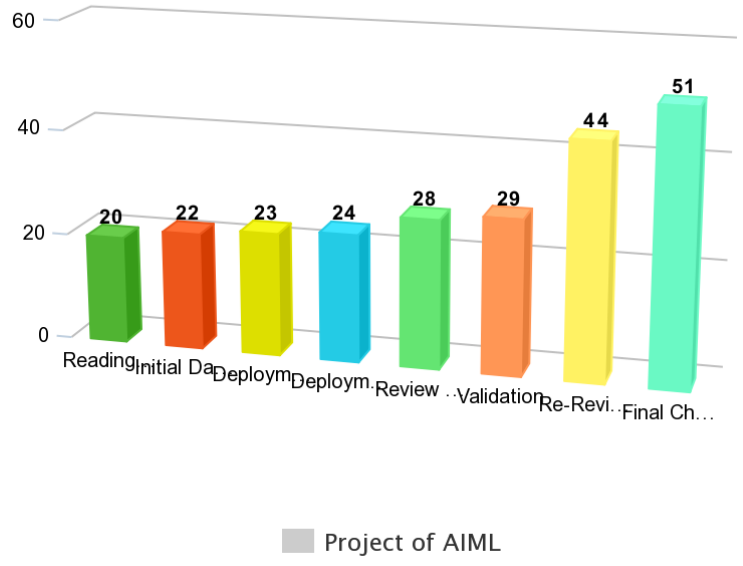
backgrounds, people with various cultures, people with their own unique way and personalities and traditions and orientations.

3. Work Plan:

1. **Creation of a theoretical approach to image masks and nets.**
2. **Creation of a python outline.**
3. **Understanding GANs.**
4. **Understanding and Creating Image Matrix.**
5. **Code and Handle Neurons.**
6. **Learn from the datasets.**
7. **Deployment of model in Python, usage of Tensorflow.**
8. **Validation and Cross Verification of Data Reality.**
9. **Perception analysis with human involvement.**

3.1 Methodology:

3.2 Time Schedule of activities giving milestones through BAR diagram.



20th August 2021- Reading and Individual Preparation
22nd August 2021- Initial Data Cleaning and Analysis
23rd August 2021- Deployment Begins
24th August 2021- Deployment Confirmation-1

28th August 2021- Review of Deployment
29th August 2021- Validation
44(13th September 2021)- Re-Review of Validation
51(20th September 2021)- Final Check and Documentation

3.3 Suggested Plan of action for utilization of research outcome expected from the project.

The plan is to understand how GANs could work in actual neural systems, as a team, we are focusing only on developments for the economic world.

This work is as of now directed towards analysis and execution of project scenario and implantation in data and fashion and creative entertainment industry only.

Other ideas and thoughts remain confidential to each of us as individual members only.

3.4 Environmental impact assessment and risk analysis.

The project directly would have no adverse impact on environment, but computational systems on which these run, produce emissions and consume power and hence we would like to mention and encourage companies and people to use renewable energy for their systems and databases and promote non-toxic elements for their machines and batteries.

4 Bibliography

References

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